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ABSTRACT

Following introductory background comments, an overview of the General College mathematics program at the University of Minnesota is given. Placement testing, course offerings, and the mathematics tutorial program are each briefly discussed. Then the program is described: students are given a choice of lecture classes, programmed instruction in a classroom setting, or programmed instruction on an independent study basis. Changes planned for 1983-84 are discussed in detail. In addition, special mathematics programs offered by the General College are noted: math anxiety program, continuing education and extension, summer institute, and other programs. An appendix includes the placement test, additional course information, and some statistics. (MNS)

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A Developmental Mathematics Program at the University of Minnesota

presented at the

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Preamble

Originally, the title of this paper was "A Remedial Mathematics Program at the University of Minnesota." A number of my colleagues expressed their discomfort due to the use of the word "Remedial" when referring to the General College Mathematics Program. While a "remedial" mathematics program means that the courses offered are designed to help students overcome deficiencies which they have in the area of mathematics, the word has derogatory connations to many people; it implies that these students are somehow less able to do the work than others. The word "developmental", which does not have any stigmas attached to it, better describes the General College Mathematics Program. Our students are developing their mathematics skills; they are at a particular stage in their mathematical growth.

Introduction

The purpose of this paper is to provide detailed information about the mathematics program of the General College. I have found, during my consulting visits to other colleges, that viewing the details of other mathematics programs helps me to visualize the strengths and weaknesses of the GC program. Hopefully, you will find some good ideas which you can use in the mathematics program at your school.

I will begin with some background information on the General College and follow this with an overview of the structure of our mathematics program and how it has developed and evolved over the years. This will be followed with a discussion of the changes which will be made for the 1983-84 academic year, and the rationale for those changes. I will conclude with a brief description of some of the special mathematics programs which the General College offers, in conjunction with other organizations, to special groups of students.

Let me begin with some background information on the General College.

Background

The creation of the General College in 1932 enabled the University of Minnesota to "broaden both its academic program and its services to Minnesota by establishing an open-door college with a new and innovative curriculum" (Moen, 1983). Over the years, one of the major tasks of the college has been to prepare its students in the basic skills areas so that they would be able to effectively compete in regular college courses. The college also serves as an "experimental educational laboratory" for the University of Minnesota. Within the last ten years, there have been two Masters theses and four Ph. D. dissertations written concerning the GC mathematics program alone. At present, there are 2 more Ph. D. theses in progress. For those of you interested in the details of the research which we have done on our mathematics program, the references are given in the appendix (page 17). The faculty and administration of the college are very interested in trying new approaches to instruction and programming at the

college level.

The General College is one of 15 colleges within the University of Minnesota. Its students comprise approximately 3400 of the 45,000 students at the University. About half of the GC students are freshmen and close to 85% of all GC students are working toward a two year Associate in Arts degree. Many of them will discontinue their college training after the first two years, but some will transfer to other colleges, such as the College of Liberal Arts or the School of Manangement, and complete a four year degree. About 15% of the students will enroll in one of the individually designed Baccalaureate Programs offered by the General College. Those of you interested in more information on the unique degree programs offered by the General College can contact me about this.

In accordance with its "open door" policy, any high school graduate from the State of Minnesota may enter the University of Minnesota through the General College. The college also accepts students with GEDs, and even some who have not finished high school or the equivalent.

The majority of the students who enter the General College do so because they could not gain acceptance to another college, due to their poor academic backgrounds, or because they wanted to work on their basic skills before competing in regular college courses. As a result, the skill levels of many of the students who enter the General College are rather low -- some beginning as low as the second grade level.

Overview of the General College Mathematics Program

The General College mathematics program consists of three parts: placement testing, content courses, and tutorial assistance. I will discuss each of these in turn.

1. Placement testing:

   All students who enter the college are required to participate in the General College Placement Program (GCPP). This is a series of tests of reading, writing and mathematics which are used to determine the skill levels of the students so that they may be placed into the appropriate college courses. Students who score poorly on these tests are strongly encouraged, by their advisors, to take skills courses early in their college careers.

   Included in the appendix (pages 18-25) is a copy of the mathematics portion of the GCPP, along with the answer key, the percentile ranks of students tested in 1980 and 1982, and the cutoff scores used to determine which classes students should take.

   If anyone would like to use this test with their own students, feel free to do so. I only ask that you let me know that you are using the test and, if you collect any normative data on your students, such as percentile ranks, that you send me a copy of the results.

While looking at the percentiles, you will note that there has been little change in the scores over the past three years. If you examine some of the questions on the GCPP, you will see that many are quite elementary, but a significant portion of the students cannot work out the answers correctly. Remember, these are, for the most part, entering college freshmen.

2. Course Offerings:

Since the test is used for placement purposes only, and not to measure achievement, its content is closely geared to the content of our developmental mathematics courses. I have included a description of the GC mathematics courses in the appendix (pages 26-29).

The courses are scheduled so that our three main courses, 1434 - Math Skills Review, 1435 - Elementary Algebra, and 1445 - Intermediate Algebra, are offered during the same hours of the day. This allows students to switch from one class to another during the quarter without major disruptions in their class schedules. While only a limited number of students actually do change classes after the quarter has begun, it is important to offer students this option. Some students register for a course and then discover that the content is either too easy or too difficult for them. By allowing students to transfer between courses, usually during the first week of classes, students are given a chance to revise their course selection decisions. Without this opportunity, students who were misplaced during registration might have to wait until the next quarter before taking the proper mathematics class. Most GC students can not afford this loss of time (and, possibly, loss of financial aid if their total credit load falls below the twelve credit minimum needed to qualify for aid in most programs).

3. Mathematics Tutorial Center:

The third component of the mathematics program is the Math Tutorial Center. This is a large room which is staffed by faculty, graduate teaching associates and undergraduate teaching assistants. Students can drop in between 9 am and 2 pm each school day for help with mathematics problems. Two tutors are available each hour and, while many more tutors would be required to meet the demand, the students benefit greatly from the help they receive. The Center serves approximately 2000 students per quarter. Sixty-five percent are GC students and the rest are from the College of Liberal Arts or other colleges on campus. Most of the assistance which we provide is for GC 1445 - Intermediate Algebra (55%), but a good deal of assistance is for courses which are only offered by the School of Mathematics (30%), including college algebra and calculus.

It should be noted that the GC mathematics program is completely separate from that of the School of Mathematics. GC offers courses ranging from arithmetic through intermediate algebra, while the School of Mathematics offers courses from intermediate algebra through the graduate level. We do not share faculty, assistants or other resources. In fact, there are no mathematicians on the GC faculty -- our faculty are all education oriented.

As you can see, the General College offers students a wide range of choice in courses and services.

This was not always the case. In 1973, the mathematics faculty developed a program for arithmetic and elementary algebra which was based totally on the programmed instruction model. The courses were almost identical in content to the ones GC offers today, but the delivery of instruction was accomplished via semi-programmed textbooks and audio tapes. The instructor and teaching assistants acted as individual tutors to the students and did no lecturing. The class size, in 1973, was thirty students with one instructor and one teaching assistant. The control was increased to forty-five, in 1975, and an additional teaching assistant was added. Approximately 25% of the students who registered for the course earned no credit, while the remaining 75% earned an average of two credits per ten week quarter. A credit consisted of successful completion of a single content area: whole numbers, fractions, decimals, percents, measurement, signed numbers, equations, factoring, rational expressions, or radicals.

While the programmed method of instruction was highly successful for some students (some, in fact, earned ten credits in a single quarter), for others it was a failure (they earned no credit). The majority of the students were only marginally successful. Since the course was less effective than had been hoped, the mathematics faculty decided, in 1978, to experiment with placing some students into homogeneous groups which would receive the traditional lecture method of instruction. In these classes, the instructor, rather than the textbook, served as the primary source of new information. The content was the same as for the programmed classes.

It soon became evident that the lecture classes were more effective for some students, while the programmed classes were more effective for other students. A research project was undertaken to determine whether or not it could be predicted which type of instruction would more closely match the individual learning styles of individual students. This study in Aptitude X Treatment Interactions was successful in identifying the student attributes which interacted with the mode of instruction to cause differential effects on learning math. However, the amount of pretesting needed was too great to be of practical value in actually placing students into courses on a regular basis.

The study did show, however, that if student characteristics were ignored, students who took the lecture sections were more successful than those who took the programmed courses.

Based on this research, the mathematics program was changed in the Fall of 1980 in order to give students more of a choice in the types of courses they could take. The three choices were, and continue to be, as follows:

1. Lecture Classes:

These classes follow the traditional lecture approach to teaching math. They generally meet for forty-five minutes per

day, five days per week, for ten weeks. The first ten minutes of each class hour is used for answering student questions and the remaining time is used for lecturing. Homework is assigned, collected, and graded each day by a teaching assistant, and returned to the students on the following class day. If you refer to the course descriptions, you will note that the classes are 1431, 1432, 1434 and 1435.

2. Programmed Instruction in a Classroom Setting:

This class follows the programmed instruction model which we have used for the past ten years. The class meets for forty-five minutes per day, five days per week for ten weeks. While in class, students study from their textbooks, do homework exercises, receive help from the instructor or teaching assistants, and take tests. The textbook serves as the primary source of instruction while the instructor and teaching assistant act only as tutors. This course is described as 1433 in your handout.

3. Programmed Instruction on an Independent Study Basis:

This class follows the programmed instruction model in that students study, from a textbook, on their own. However students are not required to come to a classroom five days per week. The students study on an independent basis and, when they need help, come to the Mathematics Tutorial Center to work with mathematics tutors. The students are less closely monitored by the faculty supervisor than those in the programmed study classroom course. When students are ready for tests, they contact the instructor, during specified hours, for the appropriate examination. This course is described as 1439 in your handout.

The above mentioned courses are taught by four mathematics professors, four science professors, (working in mathematics part time), and eight graduate teaching associates.

A listing of summary statistics on GC mathematics courses is given in the appendix (page 30). As you can see from the chart, the lecture classes have a higher average of student credit hours earned than do either of the programmed study courses.

Students are placed into the courses based on their scores on the mathematics placement test, and on their own personal preferences for working in lecture or programmed instruction classes. It should be noted that some students pick the programmed instruction classes because they do not want to attend class and/or they feel that can learn the material on their own at a faster rate than that possible within a more structured lecture format. As you can see from the chart, this is rarely the case.

Changes in the Program for 1983-84

Based on our experiences over the past three years, and due to the fact that the University of Minnesota is experiencing severe budget cuts, the GC mathematics program will be undergoing some changes for the 1983-84 academic year.

1. Changes in 1431 and 1432 Basic Mathematics:

These two courses will probably not be offered in the future. They were designed to help students who scored at the absolute bottom of the mathematics placement test (what we call level A). Such students have great difficulty working with the four basic operations of addition, subtraction, multiplication and division of whole numbers. They typically cannot do the most elementary operations with fractions or percents, and they do not fully know their multiplication tables.

These courses have been offered to small groups of students (the class size is typically 30) with the hope of helping them to learn arithmetic at a relatively slow pace over a period of two-ten week quarters. Students were given extra tutorial help outside of class and the courses were always taught by one of our more experienced mathematics teachers who had shown, in the past, great skill and patience in working with slower students. The courses were difficult to teach from the standpoint of the low skill and motiviation levels of the students and the high amount of energy expended by the instructor to keep the classes running smoothly. In addition, the courses were expensive because the class size was only two thirds of the size of a "regular" class. As a result, the investment in faculty and teaching assistant time was greater than for other classes. Unfortunately, it is generally more expensive to teach slower, high risk students than other students.

With the budget cuts which the college is experiencing, the courses have become too expensive to offer. The result is that students at the low end of the ability/achievement scale are being given less of an opportunity than they had in the past to improve their mathematics skills. Consequently, these students must certainly have a lower probability of sucessfull completion of a college degree program.

2. Changes in GC 1434 Math Skills Review:

This course has been the standard arithmetic course for the past few years. The total enrollment per year has been about 500 students. Over the past three years, it has been observed that there are generally two types of students who take this course:

a) those who had learned arithmetic at some time in the past, but who have forgotten the rules and need only a brief review.

b) those who never really learned the concepts of arithmetic and need extensive work, not only in learning the rules, but also in learning the basic concepts of arithmetic.

These two types of students usually score at different levels on the mathematics placement test. Those needing only the brief review tend to score at the upper end of the cutoff -- in the range of 13 - 19 correct on the 25 question arithmetic pretest. Those scoring at the lower end, in the four to twelve range, probably need a more extensive course in arithmetic skills. The group at the lower end of the scale would not include those students who need to work on whole numbers; this whole numbers group would be funnelled into one of the programmed instruction courses since the lowest level lecture courses will not be offered next year.

In order to accomodate students in both of these groups, a placement test will be administered on the first day of class to all students registered in 1434. A minimum of two class sections of 1434 will be offered in a single time period so that the classes may be broken up into two more or less homogeneous groups. It is expected that a group of about fifty students will form the class which needs the brief review of arithmetic, while a smaller group of about thirty students will form the class which needs the in-depth study. In effect, the more able students will be subsidizing the less able students (they will be placed into larger classes than would normally be offered). However, since the high-scoring group of students will need fewer college resources to learn the material, we feel that they will not be hurt by this procedure. In addition, classes are organized so that the group of high-scoring students will move through the material more quickly.

As with all GC courses, if a student disagrees with the placement testing outcome, that student may choose to enroll in the class which he/she feels will be most beneficial. The placement procedures are used only to advise students, not to force them into doing something which they do not want to do.

The sections of 1434 for the high-scoring and low-scoring students will be organized as follows:

a) High-scoring sections of 1434:

This class will meet three days per week, forty-five minutes each day, for ten weeks. The topics covered will be the same as for the current version of 1434, but the number of credits will be reduced from five to three. This course will count as one-fourth of the quarterly teaching load for a faculty person. Upon completion of this course, students will be ready for elementary algebra.

b) Low-scoring sections of 1434:

This class will meet five days per week, forty-five minutes each day, for ten weeks. The content will be essentially the same as the current version of 1434, except that more time will be spent on a review of whole numbers and the material will be covered in more depth than in the high-scoring sections of the course. There will be more teaching assistant help outside of class so that students can work with their own special tutor, rather than having to go to the Mathematics Tutorial Center and compete with other stu-

dents for tutorial help. Since this course meets for five days per week, and will be more difficult to teach than the high-scoring sections of 1434, it will count as one-half of the quarterly teaching load for a faculty person. Upon completion of this course, students will be ready for elementary algebra.

It is hoped that the increased time spent in class and the extra tutorial help available for the students will increase their probability of success in this course, and in subsequent mathematics courses.

3. Possible Future Changes in GC 1435 Elementary Algebra:

This elementary algebra lecture course will remain the same for the coming year. However, if the High-Low experiment proves successful with arithmetic students, it may be tried in the elementary algebra courses. Here again, it is suspected that there are two types of students -- those who have had elementary algebra in high school and who only need a review of the material, and those who have never had the course or who need to completely relearn the material.

4. Changes in GC 1443 and GC 1444, the Two Part Course in Intermediate Algebra:

The intent of breaking up the standard intermediate algebra course into two parts was to allow students to take intermediate algebra at a slower pace than would normally be required. While the idea was sound, and the courses worked well for many students, it was discovered that many were not willing to spend two quarters in a mathematics course which could be completed in one quarter. Most of them seemed to opt for trying to take the regular intermediate algebra course and, if they were not successful in the course, to drop it midway through the quarter and register for it again the following quarter. As might be expected, this strategy did not work well, but it was difficult to convince students of this fact before they tried it. Some students even dropped the intermediate algebra course and then signed up for college algebra the following quarter, thinking it was a different course and that they might be better able to understand the material.

As a consequence, the enrollment for 1443 and 1444 was rather small and, in the face of budget cuts, it was decided not to offer the courses next year. Perhaps they will be revived in the future, for it is felt that the theory is sound, even though the application left something to be desired.

5. Changes in GC 1445 Intermediate Algebra:

GC 1445 is our most popular mathematics course. It is taken mostly by GC students, but it draws a significant number of

students from other colleges as well.

This is a very difficult course for students as it represents the transition from the more concrete mathematics courses in arithmetic and elementary algebra to the more abstract college algebra and calculus courses offered by the mathematics department. Many students attempt to take the course without adequate preparation in elementary algebra (either they had elementary algebra a number of years ago, or they received grades of C or D in elementary algebra). In the past, a considerable amount of review work on elementary algebra was done in the course, but that left insufficient time to fully cover the topics of intermediate algebra. Currently, it is assumed that students who register for 1445 have a strong background in elementary algebra and little review is done. As a consequence, the success rate in the course ranges from 50% to 80%, with the average being around 70%.

In the coming year, the GC mathematics faculty will be experimenting with the structure of the course for the purpose of making it more effective while reducing its cost. This project is being supported by a grant from the Northwest Area Program on Active Learning.

The sizes of the classes will be increased from 40 to 120 students in order to reduce the faculty time needed to teach a given number of students. While no one likes having to increase class size, it seems to be the least onorous of three possible choices. The other possibilities considered include reducing the number of students who may take the course each quarter (this is not practical because of the overwhelming demand for the courses), or increasing the teaching load of the faculty (the faculty feel that they are already stretched to the limit with teaching, research, advising, committee work, etc.).

It was also felt that simply tripling class size would have a significant adverse affect on the students, especially those who we consider to be "high risk." In the 40-student classes, students were able to ask questions of the instructor at any time during the lecture. Such student-teacher interactions would be very difficult, if not impossible, in a 120 student lecture class. It was feared that the students would feel alone in the class and become more passive in their learning processes. In order to increase the active learning which should take place in a mathematics class, it was decided to experiment with a cooperative learning model for next year.

Using this model, students will be organized into small study groups within the larger lecture setting. Students within these groups will help each other learn the material of the course.

The cooperative learning model is certainly not a new idea; it has been tried by many educators in a number of different subject areas. In fact in 1978, one of our instructors, Susan Knoblauch, did her Ph. D. thesis on cooperative learning in the programmed versions of the GC arithmetic and elementary algebra classes.

The model which Knoblauch used enjoyed some success in the programmed instruction classes and it was felt that the model

could be modified to make it highly successful in the large 1445 lecture classes.

The theory and structural organization of the course will be as follows:

Currently, students in intermediate algebra are forced to work in a competative environment. This is especially true in classes where grades are determined using a specified percent of students at each grade level (i.e., by utilizing a grading curve).

Under the new structure, students will be taught how to learn in small groups, how to interact with each other in a cooperative way, and how to teach each other for the mutual benefit of both the teacher and student. It is expected this will bring about an improvement in the students' levels of achievement, and in their attitudes toward mathematics, as well as their attitudes toward being in a large University and toward cooperative learning.

The organization will be such that the classes will meet for two hours per day, five days per week, for ten weeks. Each class will begin with a question and answer period. Students will ask questions which will be answered either by the instructor or by other groups of students. The instructor will then lecture to the class as a whole on new material. After the lecture, students will break up into groups to discuss the new material and work on the homework assignment for that day. The instructor and a teaching assistant will circulate and work with the groups. If necessary, the instructor may address the class, or ask a representative of a particular group to do so.

The instructor will have four main duties in the class:

a) present new material to the class as a whole,

b) answer general questions from the students,

c) help individual groups to work effectively and efficiently,

d) help the groups interact among themselves and with the rest of the class.

There will be two types of homework assignments:

a) regular homework assignments which would be given to students in regular algebra classes,

b) assignments involving group dynamics (there will be a number of these at the beginning of the quarter and fewer and fewer as the quarter progresses).

Giving the above assignments will help students to learn the mathematical material of the course, as well as the techniques of working cooperatively in groups.

It is expected that the following interactions will take place during each class period:

a) Student-student interactions: While in class, students will

be assigned to small groups (three to five students in each group). Within these groups, students will be expected to help each other with the concepts which were presented in the lecture, develop and discuss strategies for solving problems, and present the strategies and solutions to the class.

b) Student-teacher interactions: While the groups are in session, the course instructor will be working with the various groups on both the content of the course and on ways to make the group dynamics more effective. The teacher will facilitate interactions between students within groups and between groups. It is expected that different groups will solve problems in different ways and it will be the task of the instructor to make sure that these various ways of finding solutions will be presented to, and discussed by, the class.

c) Student-subject matter interactions: By helping students conceptualize, verbalize, present, and explain various ways of looking at and solving problems in algebra, the students will become more involved with the subject matter and with each other. It is expected that students will try to devise creative ways of solving problems rather than following the standard methods which are usually taught in algebra classes.

At the present time, there are no mathematics classes offered by the General College which use a cooperative learning format. However, this year we have begun to experiment with double hour (versus single hour) mathematics classes. The teacher lectures during the first hour of class and helps students on an individual basis during the second hour. These classes worked very well and our experiences with them will be of great help in the design of some of the details of the double hour cooperative learning classes.

Most of the GC mathematics classes currently are taught using the traditional forty-five minute lecture method of teaching in which there is limited interaction between individual students and teachers and no interaction between students while in class. If this experiment proves successful, it will cause a major change in the classroom environment in GC mathematics classes.

The students will be expected to participate in the cooperative learning aspects of the course, and they will be expected to make a good faith effort to work with each other and the teacher. It is hoped that the students will internalize enough about cooperative learning to enable them to change from being passive learners to active learners.

Since each class will run for two periods, the students will be given class time to work in groups. There will be no requirement for students to work cooperatively outside of the classroom. However, it is hoped that they will begin to develop a sense of working together which will transfer to other areas of their studies.

Special Mathematics Programs Offered by the General College

In addition to the regular, day school offerings of developmental mathematics, the General College, in cooperation with other departments on campus, makes special purpose courses and programs available to specific groups of students. These special programs include the following:

1. Math Anxiety Program:

This program, offered through Continuing Education for Women, was begun in 1975 with the purpose of reducing the anxiety toward mathematics experienced by many adults. It was originally developed to help women, but about 10% of the 3000 people who have participated in the program to date have been men. The program has four parts:

a) A three hour Math Anxiety Diagnostic Clinic where the mathematics skill levels and levels of mathematics anxiety of students are assessed, and the causes and possible cures of mathematics anxiety are presented and discussed.

b) Mathematics classes where mathematics content is taught. The arithmetic and elementary algebra classes are offered one night per week, for two and one half hours each night for sixteen weeks. Two instructors are available to work with students -- one lectures on specific topics while the other tutors individual students. This model allows students to choose, within one class, whether they would like to study mathematics in a programmed instruction setting or using the traditional lecture format. For your information, a course syllabus is included in the appendix (pages 31-34).

c) A Math Anxiety Support Group, which is a structured program, led by a counseling psychologist, and designed to help those students with very high levels of mathematics anxiety. The group helps students to develop specific tools for dealing with mathematics anxiety that are applicable to various mathematics situations.

d) The Math Tutorial, where students may receive individual help outside of class, from mathematics tutors.

The program has proved very successful and has been offered not only on campus, but through a number of businesses in the Twin Cities area, including UNIVAC and Northwestern Bell Telephone.

2. Continuing Education and Extension (night school):

The General College has been offering mathematics courses to night school students for quite some time. Students who take these classes are usually working forty hours per week during the day, while at the same time pursuing bachelors degrees from the University in the evening and on weekends. Most of the students

only need a review of the rules and procedures in order to use mathematics as a tool in other classes. An equal number of men and women take the classes.

The model used for the arithmetic and elementary algebra classes is identical to that used for students in the mathematics anxiety program classes. The only difference is that the clases run for three hours per night for ten weeks and students may earn college credit for the courses.

3. The Summer Institute:

This eight week summer program, offered through the Office for Minority and Special Student Affairs, was developed in 1978 to assist minority and special students with their acclimation to the University of Minnesota. It provides work in basic math, English and study skills to students who will be entering the University in the Fall Quarter for the first time.

The mathematics classes offered include arithmetic, elementary algebra and a mathematics topics course offered by the School of Mathematics for students whose basic skills are adequate.

The courses run for two and one half hours per day, five days per week for eight weeks. The main source of information is the lecture, but there is a considerable amount of practice work done in class and there is extensive interaction between students and instructors. In addition to the regular mathematics content, a significant amount of class time is spent discussing how to study math, the uses of math, and the frustrations of studying mathematics and how to deal with them. Class size is limited to twenty students and tutorial help is available for four hours per day outside of class.

Counseling support is also available to students to help them with personal, social, economic and school related problems.

The Summer Institute has been very successful with the high risk students which it serves. Most of the students finish the mathematics courses with passing grades and continue with their mathematics learning in the Fall Quarter.

4. Other Programs:

The GC mathematics program is flexible enough to enable the faculty to offer courses tailored to the specific needs of particular groups of students. Special sections of the regular classes have been set up for students in the PEP and TRIO programs. These are federally funded retention programs which where designed to help students stay in school until they have earned their degrees. The mathematics classes offered through these programs closely follow the model used in the Summer Institute; two hour classes are offered with both lecture and tutorial assistance available in and outside of the classroom.

These programs also provide students with a good deal of

assistance and support from the counseling division of the college. It has been found that many students do not succeed because of personal, social, or financial problems and not necessarily because they cannot cope with the course content. The counselors and course instructors work closely together by exchanging information on student problems and progress in the classes. By doing this, many problems are prevented from affecting school performance in an adverse way. Students also feel much more comfortable with the knowledge that both the faculty and counselors are taking an active interest in their performance in school and in their well-being outside of school. Early intervention is a key to the success of these programs.

The mathematics section of the General College has also developed and offered basic mathematics courses to other groups of students, including courses for inmates at Stillwater Prison, groups of Asian students (who speak little English), student athletes, local communities (through neighborhood high schools), the Humphrey Institute for Public Affairs, and others. In each of these offerings, the structure and content of the courses are adjusted to fit the particular needs and abilities of the students.

Conclusion

This concludes my presentation. I hope you have found some useful information in what I have said. If anyone would like to contact me for more information or discussion my address and phone number are listed on the handout.

Reference

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Appendix

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For further information contact:

Douglas F. Robertson
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General College
University of Minnesota
106 Nicholson Hall
216 Pillsbury Drive Southeast
Minneapolis, Minnesota 55455

(612) 373-4026)

This is a test of your knowledge of arithmetic and elementary algebra. This test is very important because it will be used to help place you into the mathematics course which is most appropriate for you (i.e., the course which is neither too easy nor too hard for someone with your level of skill in mathematics). The test will be used for advising and placement purposes only, and will not count in your grade for any class.

Work out each of the following problems on scratch paper, select the correct answer from the five choices given, and then record your choice by marking the appropriate box on the answer sheet. Use a #2 or softer pencil.

Since this is a placement test, it is to your advantage not to make wild guesses. If you have no idea as to how to work a problem, leave that answer blank on your answer sheet.

Please DO NOT WRITE on this test paper. It will be used again with other students.

GC Math Placement Test Winter, 1981

1. Round 49,927 to the nearest hundred:

a) 49,800 b) 49,900 c) 47,920 d) 49,930 e) 50,000

2. Add: 7,129 + 764 + 2,022 + 78

a) 10,993 b) 10,003 c) 9,993 d) 9,923 e) 9,893

3. Subtract: 10,101 - 197

a) 10,904 b) 9,904 c) 9,804 d) 9,004 e) 1,004

4. Multiply: 756 × 98

a) 64,088 b) 73,588 c) 73,988 d) 74,088 e) 74,188

5. Divide: $17\overline{)5032}$

a) 296 b) 206 c) 285 R1 d) 2,961 e) 314 R4

6. A certain make of car gets 20 miles per gallon of gas. How many miles can the car go on 5 gallons of gas?

a) 25 b) 4 c) 100 d) 105 e) 115

7. If six apples cost 96 cents, what is the cost of two apples?

a) \$.16 b) \$.32 c) \$.48 d) \$.24 e) \$1.92

8. Find the missing numeral in the following: $\frac{5}{8} \quad \frac{?}{56}$

a) 35 b) 30 c) 7 d) 5 e) 40

9. Write as an improper fraction: $4\frac{3}{8}$

a) $\frac{35}{3}$ b) $\frac{30}{8}$ c) $\frac{32}{8}$ d) $\frac{28}{8}$ e) $\frac{35}{8}$

10. Reduce to lowest terms: $\frac{27}{90}$

a) $\frac{9}{10}$ b) $\frac{3}{10}$ c) $\frac{9}{30}$ d) $\frac{1}{15}$ e) $\frac{1}{3}$

11. Multiply: $\frac{1}{4} \times \frac{5}{6} \times \frac{2}{15}$

a) $\frac{7}{25}$ b) $\frac{5}{24}$ c) $\frac{1}{9}$ d) $\frac{1}{144}$ e) $\frac{1}{36}$

12. Multiply: $4\frac{1}{8} \times 2\frac{2}{3}$

a) $16\frac{1}{2}$ b) $8\frac{1}{12}$ c) $\frac{4}{7}$ d) 11 e) $6\frac{3}{11}$

13. Divide: $\frac{3}{5} \div \frac{7}{8}$

a) $\frac{21}{40}$ b) $\frac{35}{22}$ c) $1\frac{5}{7}$ d) $\frac{24}{35}$ e) $1\frac{11}{40}$

14. Add: $\frac{3}{4} + \frac{5}{6} + \frac{7}{15}$

a) $4\frac{2}{3}$ b) $\frac{3}{5}$ c) $2\frac{1}{20}$ d) $20\frac{1}{2}$ e) $\frac{15}{25}$

15. Subtract: $4\frac{1}{8} - 3\frac{1}{4}$

a) $1\frac{1}{4}$ b) $1\frac{1}{12}$ c) $1\frac{7}{26}$ d) $2\frac{1}{8}$ e) $\frac{7}{8}$

16. Joe's basketball team lost a close game by a score of 67 to 65. If Joe made 2/5 of the 65 points scored by his team, how many points did he score?

a) 42 b) 26 c) 20 d) 16 e) 13

17. Add: 3.458 + 1.72 + .07

a) 3.637 b) 5.248 c) 5.878 d) 4.248 e) 36.37

18. Subtract: 5 - 3.67

a) 1.33 b) 1.43 c) 2.33 d) 2.43 e) 1.32

19. Multiply: .24 x 1.5

a) 360 b) 36.0 c) 3.60 d) .360 e) .0360

20. Divide: 26 ÷ .02

a) 1,300 b) 130 c) 13 d) 1.3 e) .13

21. Write as a decimal: $\frac{1}{8}$

a) .08 b) 12.5 c) .125 d) .225 e) .8

22. Change to a decimal: $42\frac{1}{2}\%$

a) .0425 b) .425 c) 4.25 d) 42.05 e) 42.5

23. Change 1.25 to a percent:

a) .0125% b) .125% c) 1.25% d) 12.5% e) 125%

24. A shirt was on sale for 12% off the regular price of $16.25. What was the sale price of the shirt?

a) $1.95 b) $11.30 c) $14.20 d) $14.30 e) $14.40

25. In a recent basketball game, Sally made 21 out of 30 shots. What percent of her shots did she make?

a) 70% b) 63% c) 60% d) 9% e) .7%

****
Turn your answer sheet over and begin marking your answers on question number 51. There are no questions numbered 26 through 50.
****

51. Add: $-10 + 8$

a) 18 b) 2 c) -2 d) 0 e) -18

52. Evaluate: $-9 - 6$

a) 15 b) 3 c) -3 d) -7 e) -15

53. Evaluate: $-5 - (-7)$

a) 12 b) 2 c) -2 d) -6 e) -12

54. Multiply: $(-3) \times (-2) \times (-5)$

a) 150 b) 90 c) 30 d) -30 e) -90

55. Evaluate: $6 + \frac{30}{(5 + 1)} - 2^2$

a) 7 b) 8 c) 18 d) 16 e) 2

56. Simplify: $8X + (-2X)$

a) $10X$ b) $6X$ d) $5X$ d) $-6X$ e) $-10X$

57. Simplify: $-2XY^2 + 3XY + 4XY$

a) $5XY^2$ b) $5X^2Y^3$ c) $XY^2 + 4XY$

d) $-2XY^2 + 7XY$ e) $-2XY^2 + 7$

58. Simplify: $2(X + 3Y) + 5(X - Y)$

a) $7(2X + 2Y)$ b) $7X + 2Y$ c) $7X + Y$ d) $7X + 8Y$ e) $3X + 11Y$

59. Simplify: $4(2X + 1) - (X - 2)$

a) $7X + 6$ b) $9X + 2$ c) $7X + 7$ d) $3X + 2$ e) $X - 1$

60. Choose the smallest number: 1, 8, 0, -2, 5, -1.3

a) 1 b) -1.3 c) 0 d) -2 e) 5

61. Simplify: $(X^2)(X^3)$

a) $(X^2)^6$ b) X^1 c) X^6 d) $2X^5$ e) X^5

62. Simplify: $\dfrac{X^2Y^3}{XY^5}$

a) 1 b) X^3Y^8 c) XY^2 d) XY^{-2} e) XY^{11}

63. Solve for X: $X + 7 = 4$

a) -11 b) -3 c) 0 d) 3 e) 11

64. Solve for X: $3X - 5 = -17$

a) $\frac{-22}{3}$ b) -12 c) -4 d) $\frac{22}{3}$ e) 4

65. Solve for X: $4X - 5 = X + 4$

a) $\frac{14}{5}$ b) $\frac{1}{3}$ c) $\frac{17}{2}$ d) -3 e) 3

66. Solve for X and Y: $X + 2Y = 26$, $3X - Y = -6$

a) X = 5, Y = 0 b) X = -26, Y = 26 c) X = 2, Y = 12

d) $X = \frac{14}{5}$, $Y = \frac{72}{5}$ e) X = 12, Y = 2

67. Find an equation of the line containing the point (1,4) and having a slope of one half:

a) $X - 2Y = -7$ b) $4Y = X + \frac{1}{2}$ c) $Y = \frac{X}{2} + 4$

d) $2X - Y = -9$ e) $X + 4Y = \frac{1}{2}$

68. Solve for Y: $\frac{6}{y} + \frac{7}{y+2} = 1$

a) -12 and -1 b) -11 and 2 c) 5 and 6

d) 1 and 2 e) 12 and -1

69. Perform the indicated operation: $\frac{1}{x-2} - \frac{4}{x^2-4} + \frac{3}{x+2}$

a) $\frac{0}{x^2-4}$ b) $\frac{4}{x+2}$ c) $\frac{8}{x^2-4}$

d) $\frac{7}{x}$ e) $\frac{4x-7}{x^2-4}$

70. Solve for X: $\text{Log}(X^2 - 25) - \text{Log}(X + 5) = 1$

a) 1 b) 5 c) 10 d) 15 e) 20

Please hand in this test paper, your answer sheet and ALL scratch work

GC Math Section
Doug Robertson (3-4026)

Key for GC Math Placement Test
Winter, 1981

The answers to the questions on the GC Math Placement Test are as follows:

Wholes:

1 b
2 c
3 b
4 d
5 a
6 c
7 b

Fractions:

8 a
9 e
10 b
11 e
12 d
13 d
14 c
15 e
16 b

Decimals:

17 b
18 a
19 d
20 a
21 c

Percents:

22 b
23 e
24 d
25 a

Elementary Algebra:

51 c
52 e
53 b
54 d
55 a
56 b
57 d
58 c
59 a
60 d
61 e
62 d
63 b
64 c
65 e

Intermediate Algebra:

66 c
67 a
68 e
69 b
70 d

The placement criteria are as follows:

Whole numbers	Arithmetic Total	Algebra Total	Math Level
0 - 3	0 - 19	0 - 10	A
4 - 7	0 - 19	0 - 10	B
4 - 7	20 - 25	0 - 10	C
4 - 7	20 - 25	11 - 17	D
4 - 7	20 - 25	18 - 20	E

Students scoring at level E should take a placement test for College Algebra and Calculus (see Doug Robertson in N367 Elliott, 3-4026).

Students whose scores do not fall within the above ranges should see a math instructor to talk about placement.

GC Math Placement Test Percentile Ranks
Douglas Robertson

NCTM Detroit Meeting
15 April, 1983

The following data are based on 1320 entering freshmen who took the GC math placement test in 1980 and 2242 students who took the test in 1982. The percent of students who scored below a specified level are given under the columns labeled 1980 and 1982.

Whole Numbers (questions 1 - 7)

Score	1980	1982
7	77%	76%
6	47%	45%
5	24%	21%
4	10%	8%
3	3%	3%
2	0%	1%
1	0%	0%
0	0%	0%

Arithmetic Total (questions 1 - 25)

Score	1980	1982
25	98%	99%
24	96%	96%
23	93%	92%
22	89%	87%
21	83%	81%
20	77%	74%
19	70%	67%
18	64%	60%
17	57%	53%
16	50%	46%
15	44%	40%
14	37%	34%
13	30%	27%
12	24%	21%
11	20%	17%
10	14%	12%
9	10%	8%
8	7%	6%
7	5%	4%
6	2%	2%
5	2%	1%
4	1%	1%
3	0%	0%
2	0%	0%
1	0%	0%
0	0%	0%

Algebra (questions 51 - 70)

Score	1980	1982
20	99%	99%
19	99%	98%
18	98%	97%
17	96%	94%
16	92%	89%
15	88%	83%
14	81%	75%
13	75%	68%
12	67%	62%
11	60%	54%
10	52%	47%
9	44%	39%
8	37%	31%
7	28%	25%
6	22%	18%
5	16%	14%
4	11%	9%
3	9%	6%
2	5%	3%
1	3%	2%
0	0%	0%

GC Math Course Descriptions
Douglas Robertson

NCTM Detroit Meeting
15 April, 1983

All of the developmental math courses offered through the General College are listed below; many have been revised for the 1983-84 academic year. The term "GCPP level" refers to students' test scores on the math portion of the General College Placement Program (results are in students' advising folders).

Note 1: The material in 1434 and 1435 is also available on a self-paced individual study basis in a classroom setting by registering for 1433 or, on a semi-independent study basis, by registering for 1439 (offered through the Mathematics Tutorial Room). Students may not receive credit in 1433 or 1439 for equivalent work done in any other math courses (e.g., if a student takes 1434 for credit, he/she may not receive credit in 1433 or 1439 for studying fractions, decimals, percents, and/or measurement).

Note 2: An @ in front of a course number means that credit will not be granted if the equivalent course listed after the @ has been taken for credit (i.e., you cannot receive credit for both courses).

GC 1431 Basic Mathematics I (3 cr; prereq GCPP math level A, @1434)

Intended for students who have a limited background in arithmetic. Topics include the four basic operations of addition, subtraction, multiplication, and division of whole numbers, fractions, and decimals, and ratios and proportions.

GC 1432 Basic Mathematics II (3 cr; prereq 1431, @1434)

A continuation of 1431. Topics include percents, the Metric System, signed numbers, solving simple equations, formulas, scientific notation, and bar, line, and circle graphs.

GC 1433 Basic Mathematics: Programmed Study (1-10 cr, may be repeated to max 10 cr; prereq GCPP math level A or B or C or 1431 or 1432 or 1434, consent of instructor required to register for 4 or more credits in one quarter)

Intended for students who have a limited background in arithmetic and/or elementary algebra and who would like to study math at their own individual pace in a classroom setting. With the aid of the instructor, students select topics to be studied from among the following: Whole numbers, fractions, decimals, ratio and proportion, percents, the Metric System, formulas, scientific notation, bar, line, and circle graphs, properties, signed numbers, equations, inequalities, word problems, rectangular graphs, polynomials, factoring, rational expressions, and radicals. Students may not receive credit in 1433 for equivalent work done in any other math course.

GC 1434 Mathematics Skills Review (5 cr; prereq GCPP math level B, @1431, @1432)

Intended for students who have a limited background in arithmetic, but who can perform the four basic operations of addition, subtraction, multiplication and division of whole numbers. Topics include fracttions, decimals, ratio and proportion, percents, the Metric System, signed numbers, solving simple equations, formulas, scientific notation, and bar, line, and circle graphs.

GC 1435 Elementary Algebra (5 cr; prereq GCPP math level C or 1432 or 1434)

Intended for students who have a strong background in arithmetic. Topics include properties, signed numbers, equations, inequalities, word problems, rectangular graphs, polynomials, factoring, rational expressions, and radicals.

GC 1439 Basic Mathematics: Individualized Study (1-10 cr, may be repeated to max 10 cr; prereq GCPP math level A or B or C or 1431 or 1432 or 1434, consent of instructor required to register for 4 or more credits in one quarter)

Intended for students who have a limited background in arithmetic and/or elementary algebra and who would like to study math at their own individual pace on a semi-independent basis. Students are tested on the first day of class to determine which areas of arithmetic and/or algebra they will study. A contract for work to be completed during the quarter is then written with the help of the instructor. Topics to be studied may be selected from the following: Whole numbers, fractions, decimals, ratio and proportion, percents, the Metric System, formulas, scientific notation, bar, line, and circle graphs, properties, signed numbers, equations, inequalities, word problems, rectangular graphs, polynomials, factoring, rational expressions, and radicals. Students study independently and take tests when they feel they have mastered the material. Students may not receive credit in 1439 for equivalent work done in any other math course.

GC 1443 Intermediate Algebra: Part I (3 cr; prereq GCPP math level D or 1435, @1445)

Intended for students who have a good background in elementary algebra who would like to study intermediate algebra at a slower pace than 1445. Topics include sets, real numbers, linear equalities, linear inequalities, polynimials, rational expressions, exponentials, and roots.

GC 1444 Intermediate Algebra: Part II (3 cr; prereq 1443, @1445)

A continuation of 1443. Topics include quadratic equations, first and second degree relations and functions, systems of equations, systems of inequalities, exponential function, logarithmic function, sequences, and series.

GC 1445 Intermediate Algebra (5 cr; prereq GCPP math level D or 1435, @1443, @1444)

Intended for students who have a good background in elementary algebra. Topics include sets, real numbers, linear equalities, linear inequalities, polynimials, rational expressions, exponentials, roots, quadratic equations, first and second degree relations and functions, systems of equations, systems of inequalities, the exponential function, and the logarithmic function.

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The following texts are currently used for the above courses:

INTRODUCTORY MATHEMATICS, by Charles McKeague, Worth Publishers, 1981 (used in 1431, 1432, 1433, 1434, and 1439).

ELEMENTARY ALGEBRA, by Charles McKeague, Academic Press, 1982 (used in 1433, 1435, and 1439).

INTERMEDIATE ALGEBRA, by Lial and Miller, Scott Foresman, 1982 (used in 1443, 1444, and 1445).

Yearly enrollments for the courses are as follows:

Course	Class Size	# Sections/year	Total Enrollment/year
1431	30	1	30*
1432	30	1	30*
1433	40	5	200
1434	40	12	480
1435	40	15	600
1439	20	15	300*
1443	40	3	120*
1444	40	2	80*
1445	40	20	800

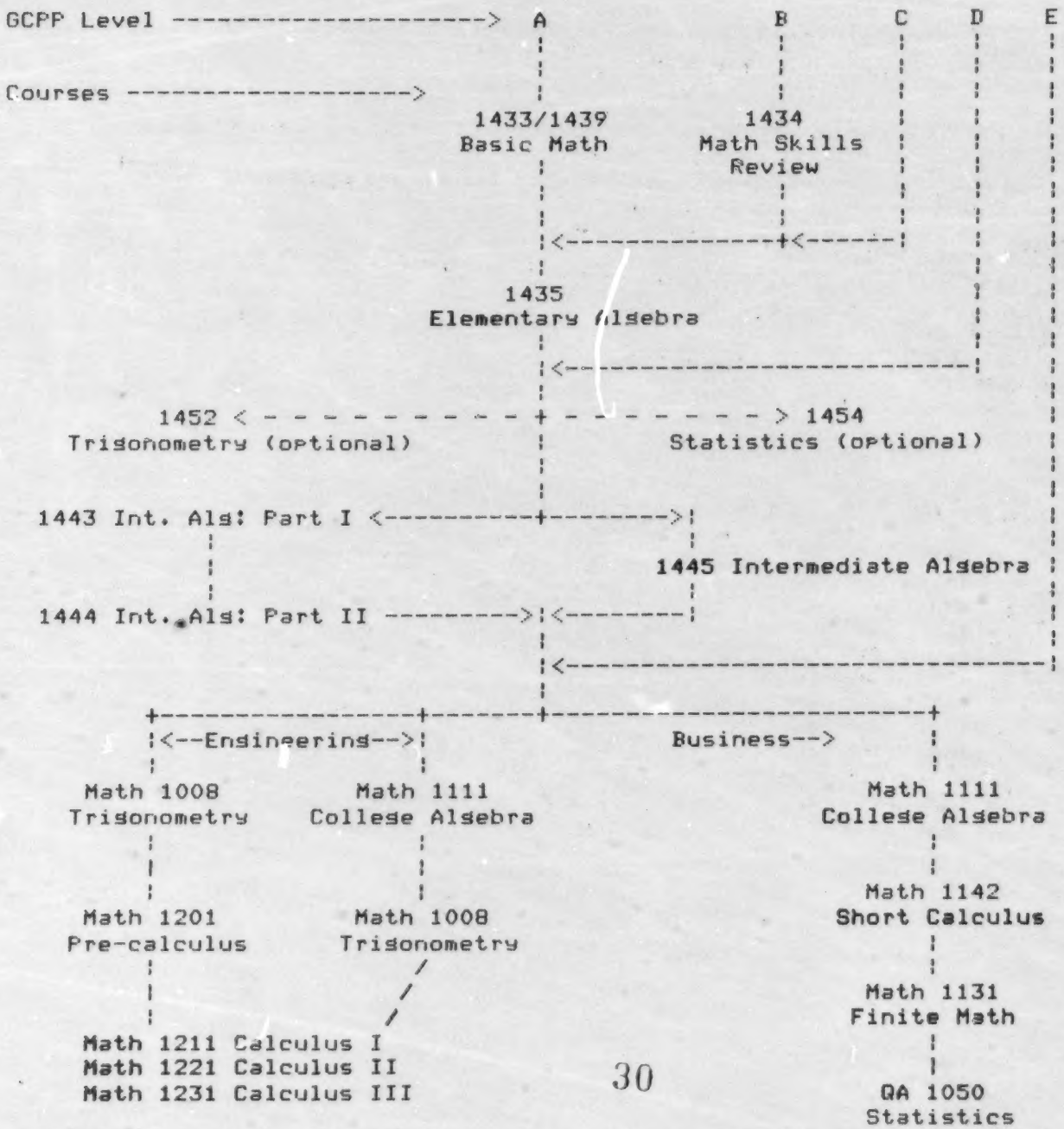
* indicates that the course will be discontinued in 1983-84 due to budget cuts.

Sequence of Math Courses
Douglas Robertson

NCTM Detroit Meeting
15 April, 1983

The chart below is designed to give you some idea of the sequence in which General College and IT math courses should be taken. The term "GCPP Level" refers to students' test scores on the math portion of the General College Placement Program (results are in students' advising folders).

NOTE: The material in GC 1434 and GC 1435 is also available on a self-paced/programmed study basis through the Mathematics Tutorial Center by registering for GC 1439 or, in a classroom setting, by registering for GC 1433.



NOTE: The sequences shown here are the ones commonly followed by students; other sequences are possible. For more information consult any math instructor.

Summary Statistics on GC Math Classes
Douglas Robertson

NCTM Detroit Meeting
15 April, 1983

Course Number	Number Credits	Type of Instruction	Number of Class Hours Per Week	Percent of Students Who Passed	Credits Earned Per Stu	Hours UTA Help
1431	3	Lecture	4.50	62%	1.9	27
1432	3	Lecture	4.50	80%	2.4	68
1433	1-10	Programmed	3.75	58%	1.8	155
1434	5	Lecture	3.75	74%	3.7	46
1435	5	Lecture	3.75	74%	3.7	57
1439	1-10	Programmed	1.50	45%	0.8	110
1443	3	Lecture	2.25	62%	1.9	67
1444	3	Lecture	2.25	61%	1.9	40
1445	5	Lecture	3.75	70%	3.5	60

CEW Arithmetic & Elementary Algebra
Doug Robertson (INTCEW)

COURSE OUTLINE
Spring, 1983

Course:	CEW Arithmetic and Elementary Algebra
Section:	Evening, Minneapolis Campus
Instructors:	Maren Watson and Doug Robertson
Office:	N367 Elliott Hall
Office Phone:	373-4026
Office Hours:	To be announced

Course Text: INTRODUCTORY MATHEMATICS, by McKeague (Wadsworth, 1981) or
ELEMENTARY ALGEBRA, by McKeague, (Academic Press, second edition, 1981).
Texts are available in Williamson Hall Bookstore.

Classrooms: 124 and 123 Folwell Hall
Class times: 6:30 to 9:00 pm, Wednesdays, 9 February through 8 June, 1983 (no class on 23 March).

Class Format: The class will be broken up into two parts: Elementary Algebra and Arithmetic Review.

5:30-6:30 Individual help and tutoring.

6:30-8:00 Lectures on algebra in 124 (students who do not want to attend the algebra lectures may study, take tests, or work with Maren in room 123).
8:00-8:05 Break (students switch rooms).
8:05-9:00 Lectures on arithmetic in 124 (students who do not want to attend the algebra lectures study, take tests, or work with Maren in room 123).

Free Tutors: 9:15 am to 2:00 pm, Monday - Friday, 3 Nicholson Hall
5:30 pm to 6:30 pm, Wednesdays, 124 Folwell Hall.

Introduction:

The instructors assume that you want to learn mathematics and that you are willing to spend a significant amount of time and make a determined effort in order to accomplish this goal. The class time is to be used each evening for listening to lectures, reading the textbook, doing homework exercises, taking tests, and getting help from the instructors. In order to maximize your learning you will have to spend a number of hours studying outside of class (the more you study, the more you will learn).

Placement:

If you are not sure which part of the course you should work on, ask Doug or Maren for the Arithmetic Planning Test. This is a test of your knowledge of basic mathematics and can be used to determine which areas of arithmetic and elementary algebra you need to work on. If you think you know where your weak points are, or if you took the test during the Diagnostic Clinic, you need not take the test.

CEW Arithmetic & Elementary Algebra
Doug Robertson (INTCEW)

COURSE OUTLINE
Spring, 1983

Arithmetic:

Those students who will study the arithmetic part of the course will use INTRODUCTORY MATHEMATICS, by McKeague (Wadsworth, 1981), for a textbook. The arithmetic section of the course is divided into the following five areas:

Area	Topic	Chapters	Pages	Number of Tests
I	Whole numbers	1-2	1-82	2
II	Fractions	3-4	83-148	2
III	Decimals & ratios	5-6	149-208	2
IV	Percents	7	209-246	1
V	Measurement and integers	8-9	247-314	2

Algebra:

Those students who will study the algebra part of the course will use ELEMENTARY ALGEBRA, by McKeague (Academic Press, second edition, 1981), for a textbook. The algebra section of the course is divided into the following five areas:

Area	Topic	Chapters	Pages	Number of Tests
I	Integers, equations, and inequalities	1-2	1-82	2
II	Graphing, exponents, and polynomials	3-4	83-172	2
III	Factoring	5	173-202	1
IV	Rational expressions	6	203-244	1
V	Roots and radicals	7	245-276	1

Homework:

Doing homework is essential if you are to succeed in the course. Homework problems will be assigned based on the particular areas of the textbook which you study. These homework problems are to be worked out and the answers checked using the key in the back of your textbook. The homework is NOT to be handed in. It is suggested that you work out the problems on regular lined paper and not in your textbook. If you tear up your textbook, or mark it excessively, it will be difficult for you to review for tests and the bookstore will not buy it back. Make sure you save all your homework until the end of the semester so that you can study from it for the chapter tests.

Calculators:

You may use a calculator while doing your homework and while taking tests.

CEW Arithmetic & Elementary Algebra
Doug Robertson (INTCEW)

COURSE OUTLINE
Spring, 1983

Attendance:

Attending class is essential if you are to complete the work for which you are registered. If you have to miss class, make sure that you work through the material at home.

Tests:

Tests for the course are optional and are given on an individual basis. When you are ready to take a particular test, ask for the one you want. Tests can be re-taken if you so desire. You may use a calculator on all tests, but you should be aware that when you take 'standardized' tests you are normally not allowed to use a calculator; a calculator is a real time saver, but if you are planning to take tests for job advancement, GRE, etc., you will have to learn to do the problems without the aid of a calculator.

Self-Pacing:

This is a 'self-paced' course. This means that you may move through the material at a rate which you feel is best for you. If you finish the required material before the last evening of class, you may decide either to wait until next semester to continue your study of mathematics or to continue study and learn more mathematics this semester.

If you would like to move through the material slower than the lectures, you may do so; one of the instructors will be available in 123 while lectures are being given in 124.

Grades:

Since this is a non-credit course, no grades are given. However, if grades were assigned, they would be as follows:

A11	100 - 96%	C6	75 - 73
A10	95 - 91	C5	72 - 70
B9	90 - 86	D4	69 - 65
B8	85 - 80	D3	64 - 60
C7	79 - 76	N	Under 60%

Syllabus:

On the next page is a listing of the course topics and the approximate dates on which they will be covered in lecture:

CEW Arithmetic & Elementary Algebra — COURSE OUTLINE
Doug Robertson (INTCEW) — Spring, 1983

Week	Date	Sections	ARITHMETIC Topics (lectures are 8:05 - 9:00)
1	2/9	1.1-1.2	Place value, comm, assoc, prop of addition
		1.4-1.6	Comm, assoc prop of mult, div, exponents
		2.2, 2.5	Roundings, distributive property
		2.7,	Order of operations
2	2/16	2.8	Prime factorization
		3.1-3.4	Fractions (reducing, mult and division)
3	2/23	3.5-3.6	Addition & subtraction, complex fractions
4	3/2	4.1-4.5	Mixed numbers
5	3/9	5.1-5.5	Decimals
6	3/16	6.1-6.3	Ratios, rates and unit pricing
7	3/23		No class
8	3/30	6.4-6.5	Proportions and word problems
9	4/6	7.1-7.3	Defn of percent, conversions, equations
10	4/13	7.4-7.7	Percent word problems
11	4/20	same	More percent word problems
12	4/27	8.1-8.3	Length, perimeter and area
13	5/4	8.4-8.6	Volume, weight and the Metric System
14	5/11	9.1-9.5	Signed numbers
15	5/18	10.1-10.3	Algebraic expressions and solving equations
16	5/25	10.4-10.5	More equation solving and word problems
17	6/1	10.5	More word problems
18	6/8	handout	Scientific notation and formulas